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09/881,505	06/14/2001	Bipul Binit Sinha	oracle01.016	7778

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ART UNIT	PAPER NUMBER
2171	7

DATE MAILED: 03/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/881,505	SINHA ET AL.	
	Examiner	Art Unit	
	Etienne P LeRoux	2171	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 December 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 June 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 2-31 are rejected under 35 U.S.C. 102(b) as being anticipated by US Pat No 5,335,343 issued to Lampson et al (hereafter Lampson).

Claim 11:

Lampson discloses a method of ensuring that a first component of a distributed system that exchanges messages belonging to a protocol for a transaction with one or more other components of the distributed system is additionally aware of a state of an other component, the state being is relevant to the protocol and the method comprising the steps practiced in the first component of:

- receiving an augmented one of the messages, the augmented message having been augmented by the other component to additionally contain information indicating the relevant state of the other component [Figs 5 and 6, coordinator sends prepare messages, col 6, lines 3-13, Figs 7 and 8 representing state diagrams, col 6, lines 25-40, prepare message to cohorts, Fig 20, 27 and 28]
- retaining the relevant state from the augmented message; and using the retained relevant state to optimize the protocol [commit message, col 6, lines 15-25, performance improvement, col 2, lines 46-53]. commit directive, Fig 20, 27 and 28]

Claim 2:

Lampson discloses the protocol ensures that the results of the transaction are consistent in the components and in the step of receiving an augmented one of the messages, the information indicating the relevant state indicates whether the transaction will modify data in the other component [col 5, lines 30-50].

Claim 3:

Lampson discloses the protocol is a two-phase commit protocol, the first component is the coordinator for the protocol, and in the step of using the retained relevant state to optimize the protocol the first component sends a message that aborts the transaction to an other component when the other component's state indicates that the transaction does not modify the data in the other component [col 5, lines 50-63 and Fig 5].

Claim 4:

Lampson discloses the distributed system is a distributed database system and the components are database systems therein [Figs 1 and 2].

Claim 5:

Lampson discloses a method of ensuring that a first component of a distributed system that exchanges messages that belong to a protocol for a transaction with one or more other components of the distributed system is additionally aware of a state of an other component, the state being relevant to the protocol and the method comprising the steps practiced in the other component of determining the relevant state and augmenting a message sent according to the protocol with state information indicating the relevant state of the other component the first component using the state information to optimize the protocol [col 2, lines 36-53]

Claim 6:

Lampson discloses the relevant state indicates whether the transaction will modify data in the other component [col 2, lines 18-25]

Claim 7:

Lampson discloses the protocol is a two-phase commit protocol, and the other component receives an abort message of the protocol when the relevant state indicates that the transaction will not modify the data in the other component [col 4, lines 33-40]

Claim 8:

Lampson discloses the distributed system is a distributed database system and the components are database systems therein [Fig 1]

Claim 9:

Lampson discloses a method of executing a two-phase commit protocol for a transaction, the transaction involving a coordinator and a cohort and the method comprising the performed in the coordinator of receiving a message of the protocol from the cohort, the message being augmented with sate information indicating whether the transaction modifies the cohort's data, retaining the state information for the cohort, and if the state information for the cohort indicates that the transaction does not modify the cohort, sending an abort message of the two-phase commit to the cohort [col 13, lines 45-60].

Claim 10:

Lampson discloses a method of executing a two-phase commit protocol for a transaction, the transaction involving a coordinator and a cohort and the method comprising the steps performed in the cohort of: augmenting a message that the cohort sends to the coordinator as part of the transaction with state information indicating whether the transaction will modify the cohort, and responding to messages received from the coordinator as required by the commit protocol, the coordinator sending a message of the commit protocol to the cohort as determined by the state information [col 14, lines 11-20]

Claim 12:

Lampson discloses the data storage device contains code which, when executed by a processor [Fig 2, 16]

Claim 13:

Lampson discloses the data storage device contains code which, when executed by a processor, performs the method of claim 2 [Fig 2, 17].

Claim 14:

Lampson discloses the data storage device contains code which, when executed by a processor, performs the method of claim 3 [Fig 2, 17].

Claim 15:

Lampson discloses the data storage device contains code which, when executed by a processor, performs the method of claim 4 [Fig 2, 17]

Claim 16:

Lampson discloses the data storage device contains code which, when executed by a processor, performs the method of claim 5 [Fig 2, 17].

Claim 17:

Lampson discloses the data storage device contains code which, when executed by a processor, performs the method of claim 6 [Fig 2, 17].

Claim 18:

Lampson discloses the data storage device contains code which, when executed by a processor, performs the method of claim 7 [Fig 2, 17].

Claim 19:.

Lampson discloses the data storage device contains code which, when executed by a processor, performs the method of claim 8 [Fig 2, 17].

Claim 20:

Lampson discloses the data storage device contains code which, when executed by a processor, performs the method of claim 9 [Fig 2, 17].

Claim 21:

Lampson discloses the data storage device contains code which, when executed by a processor, performs the method of claim 10 [Fig 2, 17].

Claim 22:

Lampson discloses a coordinator in a distributed system that coordinates a protocol for a transaction that involves one or more other components of the distributed system by exchanging messages of the protocol with the other components, the coordinator having the improvement comprising:

retained state information that retains state of an other component that is relevant to the protocol, the coordinator receiving a message of the protocol from the other component which has been augmented with the state information [abstract]

retaining the state information from the augmented message in the retained state information, and using the retained state information to optimize the protocol [abstract]

Claim 23:

Lampson discloses the protocol ensures that the results of the transaction are consistent in the components; and the retained state information for the other component indicates whether the transaction will modify data in the other component [col 6, lines 40-50]

Claim 24:

Lampson discloses the protocol is a two-phase commit protocol; and the coordinator sends a message of the protocol that aborts the transaction to an other component when the other component's retained state indicates that the transaction does not modify the data in the other component [col 6, lines 3-40]

Claim 25:

Lampson discloses wherein the distributed system is a distributed. database system and the coordinator and the other component are database systems therein [col 4, lines 40-55]

Claim 26:

- Lampson discloses the cohort being involved in a transaction coordinated according to a protocol by a coordinator and exchanging messages of the protocol with the coordinator, the cohort having the improvement comprising: a message of the protocol that is augmented with state information indicating a state of the cohort which is relevant to the protocol, the cohort sending the message to the coordinator

and the coordinator retaining the state information and using the retained state information to optimize the protocol [Figs 5 and 6, coordinator sends prepare messages, col 6, lines 3-13, Figs 7 and 8 representing state diagrams, col 6, lines 25-40, prepare message to cohorts, Fig 20, 27 and 28]

Claim 27:

Lampson discloses the protocol ensures that the results of the transaction are consistent in the components; and the state information in the augmented message indicates whether the transaction will modify data in the cohort [col 13, lines 36-58]

Claim 28:

Lampson discloses the protocol is a two-phase commit protocol; and the coordinator sends a message of the protocol that aborts the transaction to the cohort when the retained state information for the cohort indicates that the transaction does not modify the data in the cohort [Fig 11, 68a].

Claim 29:

Lampson discloses the distributed system is a distributed database system and the cohort and coordinator are database systems therein [col 3, lines 47-55].

Claim 30:

Lampson discloses a coordinator in a distributed system that coordinates a transaction that is performed according to a two-phase commit protocol and involves one or more cohorts in the distributed system, the coordinator having the improvement comprising: retained state information that retains state of a cohort, the state indicating whether the transaction will modify the cohort's data, the coordinator receiving a message of the protocol from the cohort which has been augmented with the state information, retaining the state information from the augmented message in the retained state information, and if the retained state information for the cohort indicates that the transaction does not modify the cohort's data, sending an abort message of the two-phase commit protocol to the cohort [col 3, lines 47-55].

Claim 31:

Lampson discloses a cohort in a distributed system in which a coordinator in the distributed system coordinates a transaction that is performed according to a two-phase commit protocol and involves the cohort, the cohort having the improvement comprising:

- a message of the protocol that is augmented with state information indicating whether the transaction will modify the cohort's data, the cohort sending the message to the coordinator and the coordinator retaining the state information and if the retained state information for the cohort indicates that the transaction does not modify the cohort's data [Fig 20, col 13, lines 37-58]
- sending an abort message of the two-phase commit protocol to the cohort [Fig 20, 92].

Response to Arguments

Applicant's arguments filed 12/18/2003 have been fully considered but they are not persuasive.

First Applicant Argument:

Traversal of the rejections on the basis of Lampson or Cabrera

The problem that is solved by Applicants' invention is optimizing transactions in distributed systems by reducing both the number of messages between the systems required for the transaction and the amount of processing within a system required for the transaction. The solution that is claimed in independent claims 1, 5, 9, and 10 as filed requires *augmented* transaction messages that are augmented with state information about the state of the system sending the message with regard to the transaction and one system which retains the state information from the augmented transaction messages and uses the retained state information in performing the transaction. A preferred embodiment of the augmented messages and the retained state information is discussed at page 18, line 1-page 19, line 9. Fig. 4 shows an augmented message 401 with state information 407 and retained state 415 in outgoing link table Neither Lampson nor Cabrera discloses anything like augmented messages or the retention of the state information from the augmented messages in one of the distributed

systems for use in performing the transaction. Thus, neither of these references anticipates Applicants' independent claims as filed.

First Examiner Response:

Examiner is not persuaded. Examiner notices that claim 1 has been cancelled and thus claim 1 need not be considered. The following teaching by Lampson in column 6, lines 3-40 reads on the claim 5 limitation "augmenting a message sent according to the protocol with state information indicating the relevant state of the other component:"

> Referring to FIGS. 5 and 6, the two phase commit protocol is first described under a no-failure condition. When the application 24 (the "user") reaches a point in a transaction where a commit is desired, a message or command is sent to the coordinator 25 (a "commit-transaction" command), represented by item 27 of FIG. 5. **The coordinator 25 initiates phase one of the commit protocol by sending "prepare" messages to each of the subordinates 26 in parallel, asking whether each one is prepared to let the transaction be committed, represented by item 28.** In FIG. 6, the operation of a subordinate process 26 is represented; each subordinate 26 receives the prepare message at item 29, and each subordinate first determines if it is willing to let the transaction be committed, item 30, and if so it first makes a forced write of a "prepare" log record, item 31, and second sends a "yes-vote" message to the coordinator process 25, item 32. Then, each subordinate 26 waits for a "commit" or "abort" message from the coordinator 25, represented by items 33. The process sending a " yes-vote" is said to be in the prepared state. The operation may also be represented by state diagrams as shown in FIGS. 7 and 8, where the coordinator and subordinate processes each have an idle state 27a or 29a; the subordinate process goes to a prepared state 31a upon making the forced write of a prepare record, item 31. Each subordinate 26 wishing the transaction to be aborted first does a forced-write of an abort record in its log, item 34 of FIG. 6, and then sends a "no-vote" to the coordinator 25, item 35. A "no-vote" is a veto, and the subordinate 26 sending such a "no-vote" knows the transaction will be aborted by the coordinator 25, so the subordinate 26 aborts the transaction, releases its locks, and retains no information about this transaction in its volatile storage ("forgets" the transaction), item 36. In the state diagram of FIG. 7, the subordinate process stays in the idle state upon doing the forced write of an abort record, item 34.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., augmented messages or the retention of the state information from the augmented messages in one of the distributed systems for use in performing the transaction) are not recited in the rejected claim(s). Although the claims are interpreted in light of the

specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Second Applicant Argument:

Applicant states in the second paragraph on page 14;

Detailed rebuttal of the rejection based on Lampson

What Lampson discloses is techniques for reducing the number of writes to logs required for a transaction. The techniques do not employ state information received from augmented messages. In his discussion of Lampson, Examiner cites Lampson's FIGS. 20 and 20a as showing Applicants' augmented messages, but there is nothing in the Figures or the discussion of the figures at col. 13, line 31-col. 14, line 50 to indicate in any way that the messages are *augmented with* information about the state of the sending system. Since there are no augmented messages, there can also be no retained state information received from such augmented messages that is used in performing the transaction. For this limitation, Examiner cites col. 13, lines 45-58, which only describes how Lampson's system writes an "abort" log record. There is no disclosure that the "abort log record" is used in performing the transaction, as required by the claims.

Second Examiner Response:

Examiner is not persuaded. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., the messages are *augmented with* information about the state of the sending system) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Third applicant Argument:

Applicant states in the third paragraph on page 14;

Detailed rebuttal of the rejection based on Cabrera

Cabrera discloses a technique for keeping track of which copies of data stored in a set of mirrored disks are currently up to date. To keep track, Cabrera associates a data structure of 2n bits with the data, where n is the number of mirrored disks. This data structure is termed a *cohort set*. Again, the technique does not employ state information received from augmented messages. In his discussion of Cabrera, Examiner cites col. 7, lines 16-22 as disclosing the augmented messages, but what is described there is how the cohort sets are modified. The modification of the cohort sets does not depend on information from augmented messages. Examiner cites col. 7, lines 5-15 and FIG. 6 as showing how the relevant state is retained, but the cited location describes the cohort sets, which do retain state, but not state obtained from augmented messages, as required by the claims.

Third Examiner Response:

Examiner is not persuaded. Examiner maintains that the following teaching by Cabrera in column 7, lines 5-32 reads on the claim 5 limitation "augmenting a message sent according to the protocol with state information indicating the relevant state of the other component"

> FIG. 6 illustrates a detailed view of the two-phase update process 600. First the updating of the tentative cohort sets is initiated 602 in the first phase. If this fails 604, the system can fall back to the original committed cohort sets 606. In the second phase, the updating of the committed cohort sets is initiated 608. Should this fail 610, then the tentative cohort sets that remain can be used in conjunction with the newly committed cohort sets 612. Otherwise, the tentative cohort sets are cleared and the complete committed cohort sets are written 614.
>
> All cohort sets are modified when a write operation occurs following a failure. It is assumed that write operations are sufficiently frequent to provide sufficiently fine grained failure detection. If this is not the case, then cohort sets can be modified when read operations occur. Furthermore, an asynchronous failure notification mechanism may be used to modify the cohort sets.
>
> It should be noted that correct operation does not depend on the granularity of failure detection. The granularity is only important for the availability of the system, since rapid failure detection will mean that the information in the cohort sets is current and this provides for more rapid recovery. This is easy to see in the case of no failure detection, then the cohort sets would always indicate every copy, which would mean that every copy would have to be present for the system to recover.

Fourth Applicant Argument:

Applicant states in the third paragraph on page 15:

A difference between what Hallmark discloses and Applicants' disclosure is that Hallmark's piggybacked SCN's have nothing to do with the way the 2-phase commit protocol itself is executed in Hallmark. To ensure this distinction is clear in Applicants' claims, Applicants have replaced claim 1 with claim 11 and have amended claim 5 to clearly distinguish what is set forth in the claims from Hallmark's technique involving piggybacked SCNs.

Fourth Examiner Response:

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., piggy-backed SCNs) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Fifth Applicant Argument:

Applicant states in the fourth paragraph on page 15;

Claim 11 is exemplary: 11. (new) A method of ensuring that a first component of a distributed system that exchanges messages belonging to a protocol for a transaction with one or more other components of the distributed system is additionally aware of a state the method comprising the steps practiced in the first component of: receiving an augmented one of the messages, the augmented message information indicating the relevant state of the other component; retaining the relevant state from the augmented message; and using the retained relevant state to optimize the protocol. Beginning with the preamble, the preamble now sets forth that the messages "belong to a protocol for a transaction" and that the first component " is additionally aware of a state of the other component, the state being relevant to the protocol". As already pointed out, in Hallmark, the values of the SCN's are not "state [that is] relevant to the protocol".

Fifth

Fifth Examiner Response:

Examiner is slightly persuaded. In order to advance prosecution the rejection in view of Hallmark has been withdrawn

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Etienne LeRoux whose telephone number is (703) 305-0620. The examiner can normally be reached on Monday – Friday from 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Safet Metjahic, can be reached on (703) 308-1436.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Etienne LeRoux

3/23/2004

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